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OPERATOR'S MANUAL

TEXTRON LYCOMING
Aircraft Engines

SERIES

O-320, IO-320, AIO-320
& LIO-320

60297-16

TEXTRON Lycoming

652 Oliver Street
Williamsport, PA 17701 U.S.A.

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TEXTRON Lycoming
OPERATOR'S MANUAL
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OPERATOR'S MANUAL

TEXTRON Lycoming

O-320, IO-320, AIO-320, LIO-320 SERIES AIRCRAFT ENGINES

2nd Edition

March 1973

Approved by F.A.A.

Part No. 60297-16

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LYCOMING OPERATOR'S MANUAL

ATTENTION

OWNERS, OPERATORS, AND MAINTENANCE PERSONNEL

This operator's manual contains a description of the engine, its specifications, and detailed information on how to operate and maintain it. Such maintenance procedures that may be required in conjunction with periodic inspections are also included. This manual is intended for use by owners, pilots and maintenance personnel responsible for care of Lycoming powered aircraft. Modifications and repair procedures are contained in Lycoming overhaul manuals; maintenance personnel should refer to these for such procedures.

SAFETY WARNING

Neglecting to follow the operating instructions and to carry out periodic maintenance procedures can result in poor engine performance and power loss. Also, if power and speed limitations specified in this manual are exceeded, for any reason; damage to the engine and personal injury can happen. Consult your local FAA approved maintenance facility.

SERVICE BULLETINS, INSTRUCTIONS, AND LETTERS

Although the information contained in this manual is up-to-date at time of publication, users are urged to keep abreast of later information through Lycoming Service Bulletins, Instructions and Service Letters which are available from all Lycoming distributors or from the factory by subscription. Consult the latest edition of Service Letter No. L114 for subscription information.

SPECIAL NOTE

The illustrations, pictures and drawings shown in this publication are typical of the subject matter they portray; in no instance are they to be interpreted as examples of any specific engine, equipment or part thereof.

TEXTRON LYCOMING OPERATOR'S MANUAL

IMPORTANT SAFETY NOTICE

Proper service and repair is essential to increase the safe, reliable operation of all aircraft engines. The service procedures recommended by Textron Lycoming are effective methods for performing service operations. Some of these service operations require the use of tools specially designed for the task. These special tools must be used when and as recommended.

It is important to note that most Textron Lycoming publications contain various Warnings and Cautions which must be carefully read in order to minimize the risk of personal injury or the use of improper service methods that may damage the engine or render it unsafe.

It is also important to understand that these Warnings and Cautions are not all inclusive. Textron Lycoming could not possibly know, evaluate or advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences that may be involved. Accordingly, anyone who uses a service procedure must first satisfy themselves thoroughly that neither their safety nor aircraft safety will be jeopardized by the service procedure they select.

TEXTRON Lycoming

WARRANTY

(LIMITED)

NEW AND REMANUFACTURED RECIPROCATING AIRCRAFT ENGINE

WHAT TEXTRON LYCOMING PROMISES YOU

Textron Lycoming warrants each new and remanufactured reciprocating engine sold by it to be free from defects in material and workmanship appearing within one (1) year from the date of first operation, excluding necessary aircraft acceptance testing. The date of first operation must not exceed two (2) years from the date of shipment from Textron Lycoming.

Textron Lycoming's obligation under this warranty shall be limited to its choice of repair or replacement, on an exchange basis, of the engine or any part of the engine, when Textron Lycoming has determined that the engine is defective in material or workmanship. Such repair or replacement will be made by Textron Lycoming at no charge to you. Textron Lycoming will also bear the cost for labor in connection with the repair or replacement as provided in Textron Lycoming's then current Removal and Installation Labor Allowance Guidebook.

In addition, if Textron Lycoming determines that the engine proves to be defective in material or workmanship during the period until the expiration of Textron Lycoming's recommended Time Between Overhaul (TBO), or two (2) years from the date of first operation, whichever occurs first, Textron Lycoming will reimburse you for a pro rata portion of the charge for the repair or replacement (at its choice) with Textron Lycoming parts, of parts required to be repaired or replaced, or a replacement engine, if it determines that engine replacement is required. Textron Lycoming's obligation during the proration period extends to major parts of the engine, which are limited to crankcase, crankshaft, camshaft, cylinders, connecting rods, pistons, sump, accessory housing and gears. The proration policy does not extend to labor or to accessories, including but not limited to magnetos, carburetors or fuel injectors, fuel pumps, starters, alternators and turbochargers and their controllers.

Any engine or part so repaired or replaced will be entitled to warranty for the remainder of the original warranty period.

YOUR OBLIGATIONS

The engine must have received normal use and service. You must apply for warranty with an authorized Textron Lycoming distributor within 30 days of the appearance of the defect in material or workmanship.

Textron Lycoming's warranty does not cover normal maintenance expenses or consumable items. The obligations on the part of Textron Lycoming set forth above are your exclusive remedy and the exclusive liability of Textron Lycoming. This warranty allocates the risk of product failure between you and Textron Lycoming, as permitted by applicable law.

Textron Lycoming reserves the right to deny any warranty claim if it reasonably determines that the engine or part has been subject to accident or used, adjusted, altered, handled, maintained or stored other than as directed in your operator's manual, or if non-genuine Textron Lycoming parts are installed in or on the engine and are determined to be a possible cause of the incident for which the warranty application is filed.

Textron Lycoming may change the construction of engines at any time without incurring any obligation to incorporate such alterations in engines or parts previously sold.

THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESS OR IMPLIED OR STATUTORY, WHETHER WRITTEN OR ORAL, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, AND ANY IMPLIED WARRANTY ARISING FROM ANY COURSE OF PERFORMANCE OR DEALING OR TRADE USAGE. THIS WARRANTY IS ALSO IN LIEU OF ANY OTHER OBLIGATION, LIABILITY, RIGHT OR CLAIM, WHETHER IN CONTRACT OR IN TORT, INCLUDING ANY RIGHT IN STRICT LIABILITY IN TORT OR ANY RIGHT ARISING FROM NEGLIGENCE ON THE PART OF TEXTRON LYCOMING, AND TEXTRON LYCOMING'S LIABILITY ON SUCH CLAIM SHALL IN NO CASE EXCEED THE PRICE ALLOCABLE TO THE ENGINE OR PART WHICH GIVES RISE TO THE CLAIM.

LIMITATION OF LIABILITY

IN NO EVENT, WHETHER AS A RESULT OF A BREACH OF WARRANTY, CONTRACT OR ALLEGED NEGLIGENCE, SHALL TEXTRON LYCOMING BE LIABLE FOR SPECIAL OR CONSEQUENTIAL OR ANY OTHER DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF PROFITS OR REVENUES, LOSS OF USE OF THE ENGINE OR COST OF A REPLACEMENT.

No agreement varying this warranty or Textron Lycoming's obligations under it will be binding upon Textron Lycoming unless in writing signed by a duly authorized representative of Textron Lycoming.

Effective October 1, 1995 Revision "J"

*Textron Lycoming
Williamsport, Pennsylvania*

TEXTRON Lycoming

WARRANTY

(LIMITED)

REPLACEMENT PART - RECIPROCATING AIRCRAFT ENGINE

WHAT TEXTRON LYCOMING PROMISES YOU

Textron Lycoming warrants each new reciprocating aircraft engine replacement part sold by it to be free from defects in material and workmanship appearing within one (1) year from its date of first operation. The date of first operation must not exceed two (2) years from the date of shipment from Textron Lycoming.

Textron Lycoming's obligation under this warranty shall be limited to its choice of repair or replacement, on an exchange basis, of the replacement part, when Textron Lycoming has determined that the part is defective in material or workmanship. Textron Lycoming will also reimburse you for the costs for labor in connection with the repair or replacement as provided in Textron Lycoming's then current Removal and Installation Labor Allowance Guidebook.

Any part so repaired or replaced will be warranted for the remainder of the original warranty period.

YOUR OBLIGATIONS

The engine in which the replacement part is installed must have received normal use and service. You must apply for warranty with an authorized Textron Lycoming distributor within 30 days of the appearance of the defect in material or workmanship.

Textron Lycoming's warranty does not cover normal maintenance expenses or consumable items. The obligations on the part of Textron Lycoming set forth above are your exclusive remedy and the exclusive liability of Textron Lycoming. This warranty allocates the risk of product failure between you and Textron Lycoming, as permitted by applicable law.

Textron Lycoming reserves the right to deny any warranty claim if it reasonably determines that the engine or part has been subject to accident or used, adjusted, altered, handled, maintained or stored other than as directed in your operator's manual, or if non-genuine Textron Lycoming parts are installed in or on the engine and are determined to be a possible cause of the incident for which the warranty application is filed.

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THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES AND REPRESENTATIONS, EXPRESS OR IMPLIED OR STATUTORY, WHETHER WRITTEN OR ORAL, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, AND ANY IMPLIED WARRANTY ARISING FROM ANY COURSE OF PERFORMANCE OR DEALING OR TRADE USAGE. THIS WARRANTY IS ALSO IN LIEU OF ANY OTHER OBLIGATION, LIABILITY, RIGHT OR CLAIM, WHETHER IN CONTRACT OR IN TORT, INCLUDING ANY RIGHT IN STRICT LIABILITY IN TORT OR ANY RIGHT ARISING FROM NEGLIGENCE ON THE PART OF TEXTRON LYCOMING, AND TEXTRON LYCOMING'S LIABILITY ON SUCH CLAIM SHALL IN NO CASE EXCEED THE PRICE ALLOCABLE TO THE ENGINE OR PART WHICH GIVES RISE TO THE CLAIM.

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*Textron Lycoming
Williamsport, Pennsylvania*

TEXTRON Lycoming

WARRANTY

(LIMITED)
OVERHAULED
RECIPROCATING AIRCRAFT ENGINE

WHAT TEXTRON LYCOMING PROMISES YOU

Textron Lycoming warrants each overhauled reciprocating engine sold by it to be free from defects in material and workmanship appearing within one (1) year from the date of first operation, excluding necessary aircraft acceptance testing. The date of first operation must not exceed two (2) years from the date of shipment from Textron Lycoming.

Textron Lycoming's obligation under this warranty shall be limited to its choice of repair or replacement, on an exchange basis, of the engine or any part of the engine, when Textron Lycoming has determined that the engine is defective in material or workmanship. Such repair or replacement will be made by Textron Lycoming at no charge to you. Textron Lycoming will also bear the cost for labor in connection with the repair or replacement as provided in Textron Lycoming's then current Removal and Installation Labor Allowance Guidebook.

Any engine or part so repaired or replaced will be entitled to warranty for the remainder of the original warranty period.

YOUR OBLIGATIONS

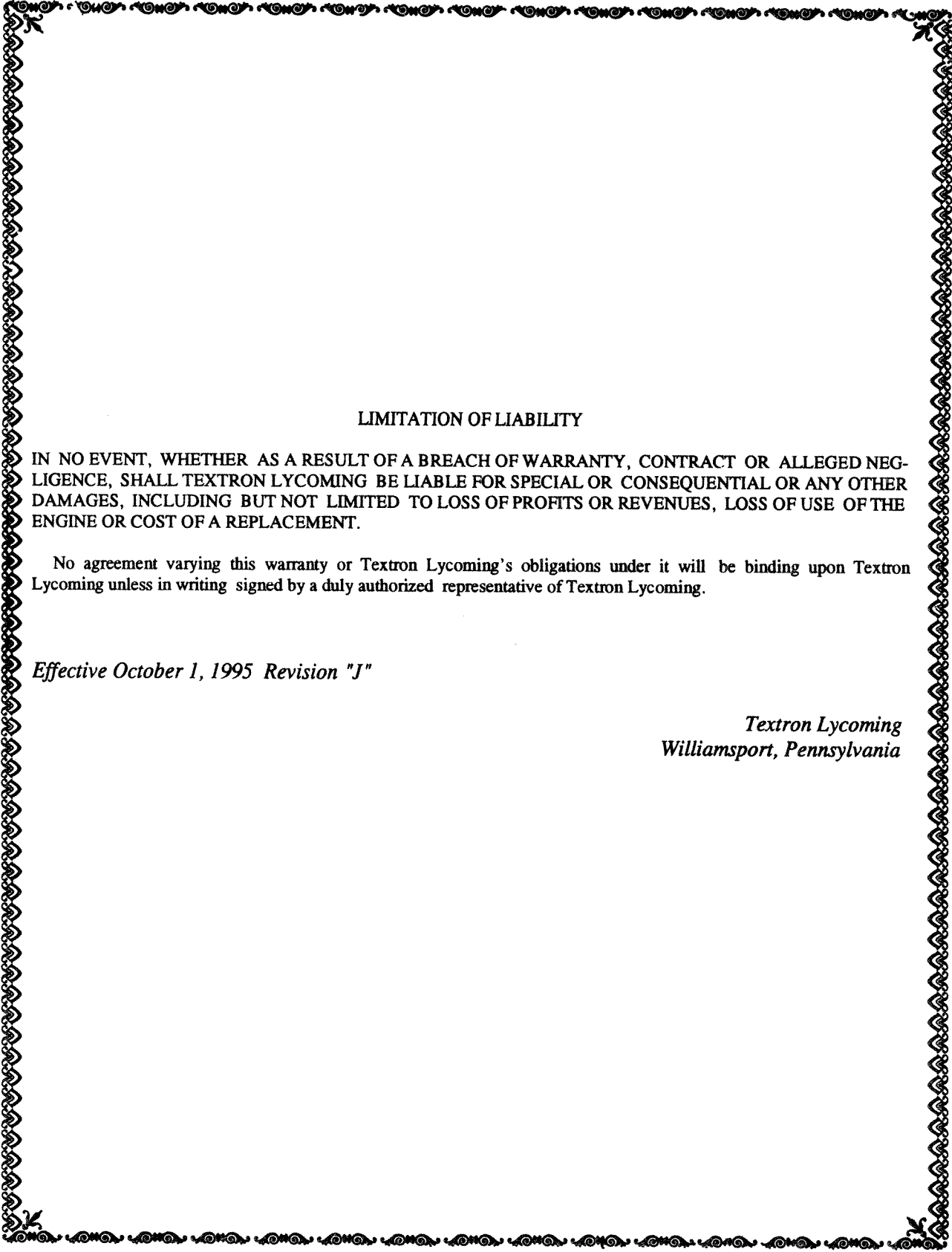
The engine must have received normal use and service. You must apply for warranty with an authorized Textron Lycoming distributor within 30 days of the appearance of the defect in material or workmanship.

Textron Lycoming's warranty does not cover normal maintenance expenses or consumable items. The obligations on the part of Textron Lycoming set forth above are your exclusive remedy and the exclusive liability of Textron Lycoming. This warranty allocates the risk of product failure between you and Textron Lycoming, as permitted by applicable law.

Textron Lycoming reserves the right to deny any warranty claim if it reasonably determines that the engine or part has been subject to accident or used, adjusted, altered, handled, maintained or stored other than as directed in your operator's manual, or if non-genuine Textron Lycoming parts are installed in or on the engine and are determined to be a possible cause of the incident for which the warranty application is filed.

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LIMITATION OF LIABILITY

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*Textron Lycoming
Williamsport, Pennsylvania*

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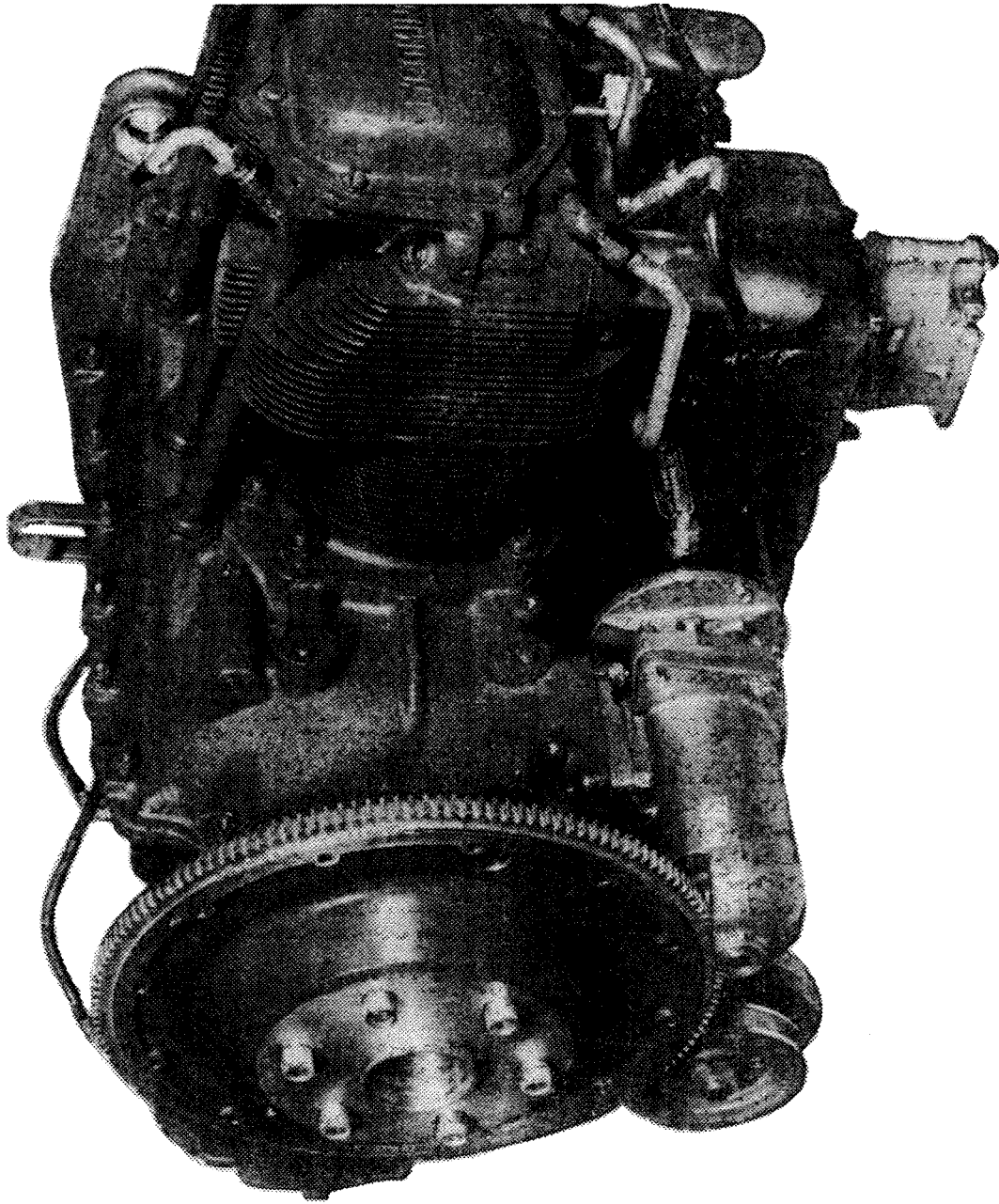
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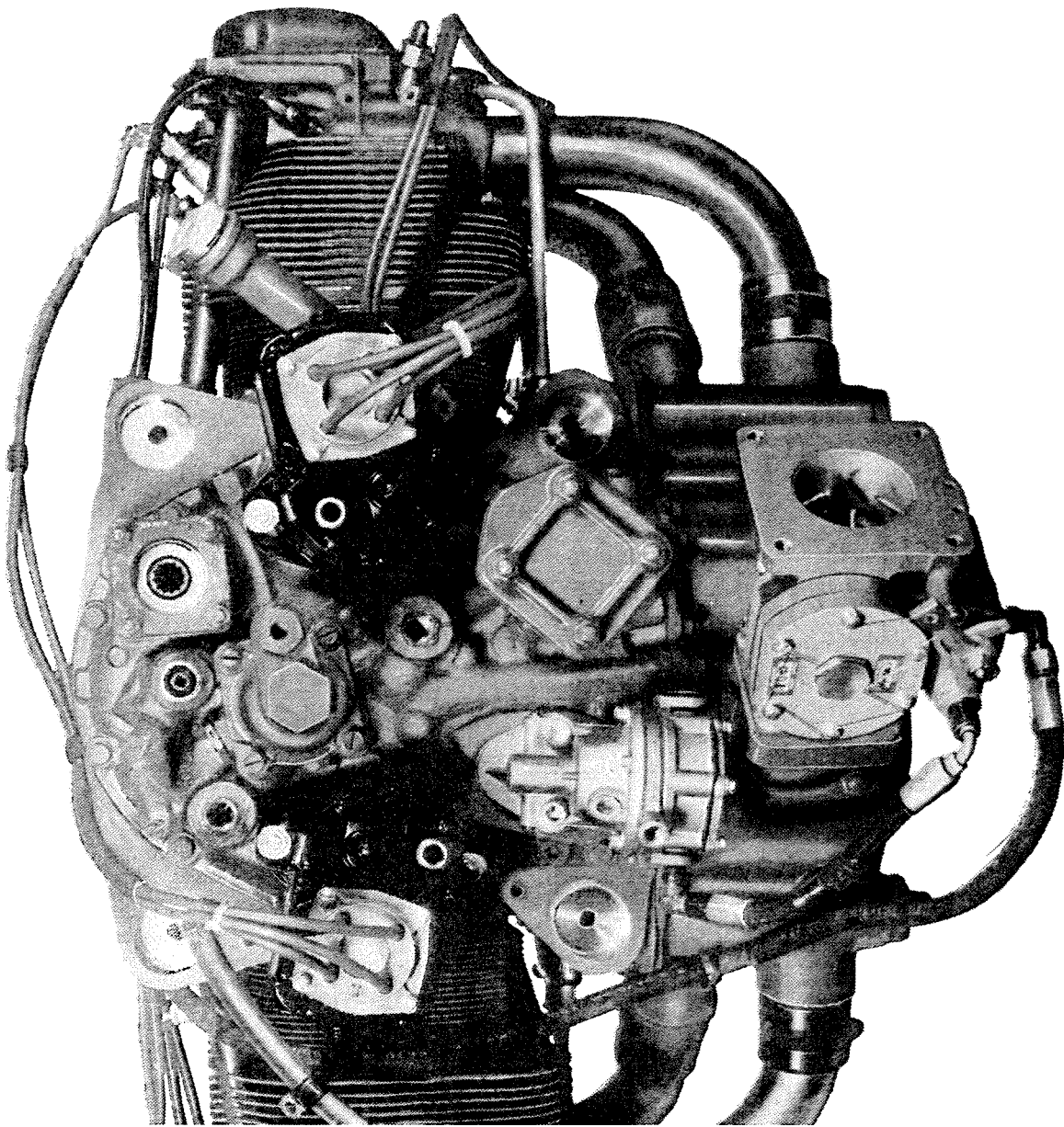
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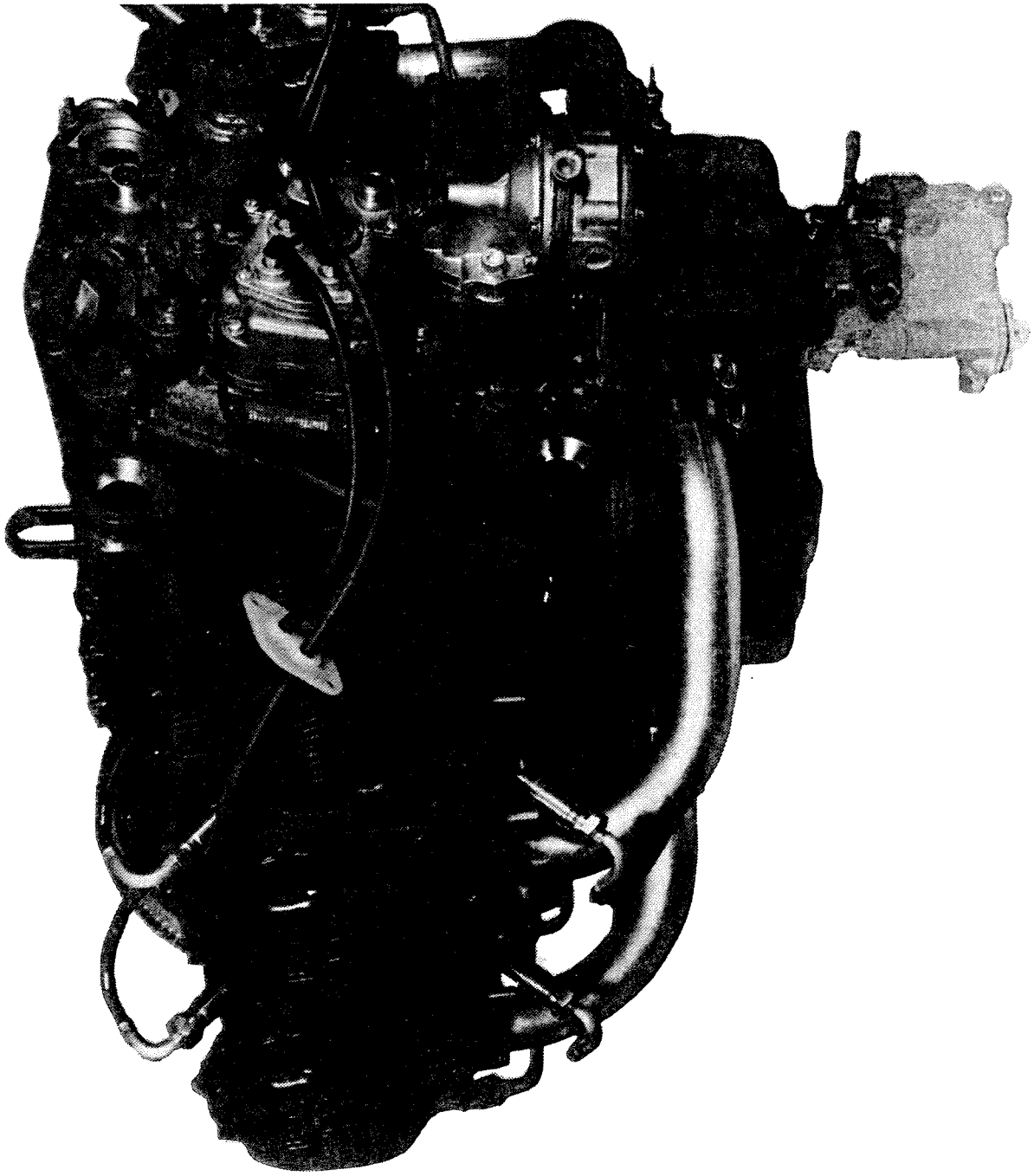


3/4 Left Front View - Typical O-320 Series

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Rear View - Typical IO-320-B Series



3/4 Left Rear View - Typical O-320 Series

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DESCRIPTION

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O-320 & IO-320 SERIES

SECTION 1

SECTION 1

DESCRIPTION

The O, IO, AIO and LIO-320 series are four cylinder, direct drive, horizontally opposed, air cooled engines.

In referring to the location of the various engine components, the parts are described in their relationship to the engine as installed in the airframe. Thus, the power take-off end is considered the front and the accessory drive end the rear. The sump section is considered the bottom and the opposite side of the engine where the shroud tubes are located the top. Reference to the left and right side is made with the observer facing the rear of the engine. The cylinders are numbered from front to rear, odd numbers on the right, even numbers on the left. The direction of rotation for accessory drives is determined with the observer facing the drive pad. The direction of rotation of the crankshaft, viewed from the rear, is clockwise.

NOTE

The letter "L" in the model prefix denotes the reverse rotation of the basic model. Example: model IO-320-C has clockwise rotation of the crankshaft. Therefore, LIO-320-C has counter-clockwise rotation of the crankshaft. Likewise, the rotation of the accessory drives of the LIO-320-C are opposite those of the basic model as listed in Section 2 of this manual.

Operational aspects of both engines are the same and performance curves and specifications for the basic model will apply to the model with reverse rotation.

Crankcase - The crankcase assembly consists of two reinforced aluminum alloy castings, fastened together by means of studs, bolts and nuts. The mating surfaces of the two castings are joined without the use of a gasket, and the main bearing bores are machined for use of precision type main bearing inserts.

Crankshaft - The crankshaft is made from a chrome nickel molybdenum steel forging. All bearing journal surfaces are nitrided.

Connecting Rods - The connecting rods are made in the form of "H" sections from alloy steel forgings. They have replaceable bearing inserts in the crankshaft ends and bronze bushings in the piston ends. The bearing caps on the crankshaft ends are retained by two bolts and nuts through each cap.

Pistons - The pistons are machined from an aluminum alloy. The piston pin is of a full floating type with a plug located in each end of the pin. Depending on the cylinder assembly, pistons may employ either half wedge or full wedge rings. Consult the latest revision of Service Instruction No. 1037 for proper piston and ring combinations.

Accessory Housing - The accessory housing is made from an aluminum casting and is fastened to the rear of the crankcase and the top rear of the sump. It forms a housing for the oil pump and the various accessory drives.

Oil Sump (Except -AIO Series) - The sump incorporates an oil drain plug, oil suction screen, mounting pad for carburetor or fuel injector, the intake riser and intake pipe connections.

Crankcase Covers (-AIO Series) - Crankcase covers are employed on the top and bottom of the engine. These covers incorporate oil suction screens, oil scavenge line connections. The top cover incorporates a connection for a breather line and the lower cover a connection for an oil suction line.

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O-320 & IO-320 SERIES

SECTION 1

Cooling System - These engines are designed to be cooled by air pressure. Baffles are provided to build up a pressure and force the air through the cylinder fins. The air is then exhausted to the atmosphere through gills or augmentor tubes usually located at the rear of the cowling.

Induction System - Avco Lycoming O-320 series engines are equipped with a float type carburetor. Particularly good distribution of the fuel - air mixture to each cylinder is obtained through the center zone induction system, which is integral with the oil sump and is submerged in oil, insuring a more uniform vaporization of fuel and aiding in cooling the oil in the sump. From the riser the fuel - air mixture is distributed to each cylinder by individual intake pipes.

Avco Lycoming IO-320 series engines are equipped with a Bendix type RSA fuel injector. The fuel injection system schedules fuel flow in proportion to air flow and fuel vaporization takes place at the intake ports.

A brief description of the carburetors and fuel injectors follows:

The Marvel-Schebler MA-4SPA and HA-6 carburetors are of the single barrel float type equipped with a manual mixture control and an idle-cut-off.

The Bendix RSA type fuel injection system is based on the principle of measuring air flow and using the air flow signal in a stem type regulator to convert the air force into a fuel force. This fuel force (fuel pressure differential) when applied across the fuel metering section (jetting system) makes fuel flow proportional to air flow. A manual mixture control and idle-cut-off are provided.

Lubrication System - The lubrication system is of the pressure wet sump type. The main bearings, connecting rod bearings, camshaft bearings, valve tappets, push rods and crankshaft idler gears are lubricated by means of oil collectors and spray. The oil pump, which is located in the accessory

This relief valve regulates the engine oil pressure by allowing excessive oil to return to the sump, while the balance of the pressure oil is fed to the main oil gallery in the right half of the crankcase. During its travel through this main gallery, the oil is distributed by means of separate drilled passages to the main bearings of the crankshaft. Separate passages from the rear main bearings supply pressure oil to both crankshaft idler gears. Angular holes are drilled through the main bearings to the rod journals. Oil from the main oil gallery also flows to the cam and valve gear passages, and is then conducted through branch passages to the hydraulic tappets and camshaft bearings. Oil enters the tappets through indexing holes and travels out through the hollow push rods to the valve mechanism, lubricating the valve rocker bearings and valve stems. Residual oil from the bearings, accessory drives and the rocker boxes is returned by gravity to the sump, where after passing through a screen it is again circulated through the engine. Pressure build up within the crankcase is held to a minimum by means of a breather located on the accessory housing.

In addition, model IO-320-C1A incorporates oil jets in the crankcase. The oil jets furnish an oil spray to provide internal cooling for the pistons.

Priming System - Provision for a primer system is provided on all engines employing a carburetor. Fuel injected engines do not require a priming system.

Ignition System - Dual ignition is furnished by two magnetos. Consult Table 1 for model application. Bendix magnetos are designed to permit periodic internal maintenance; Slick Electro magnetos are designed to operate for approximately 900 hours without internal maintenance.

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0-320 & IO-320 SERIES

SECTION 1

MODEL APPLICATION					
Model	Left	Right	Height	Width	Length
0-320					
-A1A, -A1B	S4LN-21	S4LN-20	22.99	32.24	29.56
-A2A*, -A2B*	S4LN-21	S4LN-20	22.99	32.24	29.56
-A3A, -A3B	S4LN-21	S4LN-20	22.99	32.24	29.56
-A2C*, -A3C	S4LN-200	S4LN-204	22.99	32.24	29.81
-B1A, -B1B	S4LN-21	S4LN-20	22.99	32.24	29.56
-B2A*, -B2B*	S4LN-21	S4LN-20	22.99	32.24	29.56
-B3A, -B3B	S4LN-21	S4LN-20	22.99	32.24	29.56
-B2C*, -B3C	S4LN-200	S4LN-204	22.99	32.24	29.81
-D1A, -D2A*	S4LN-21	S4LN-20	22.99	32.24	29.56
-D1B, -D2B*	S4LN-200	S4LN-204	22.99	32.24	29.56
-D1C, -D2C*	S4LN-1227	S4LN-1209	22.99	32.24	30.70
-D1F, -D2F*	S4LN-1227	S4LN-1209	22.99	32.24	30.70
-E1A, -E2A*	S4LN-21	S4LN-20	22.99	32.24	29.56
-E1B, -E2B*	S4LN-200	S4LN-204	22.99	32.24	29.81
-E1C, -E2C*	S4LN-1227	S4LN-1209	22.99	32.24	30.70
-E1F, -E2F*	S4LN-1227	S4LN-1209	22.99	32.24	30.70
-E2D*, -E3D*	4051	4050	22.99	32.24	29.05
-A2D*, -E2G*	4051	4050	22.99	32.24	29.05
-D2G, -D3G	4051	4050	22.99	32.24	29.05
-E2H*, -E3H*	S4LN-21	S4LN-20	22.99	32.24	29.56
-D1D	4051	4050	19.22	32.24	31.82
-D2J*	4251	4251	23.00	32.24	29.05
IO-320					
-A1A, -A2A*	S4LN-200	S4LN-204	19.22	32.24	33.59
-B1A, -B2A*	S4LN-21	S4LN-20	19.22	32.24	33.59

AIO-320					
-A1A, -A2A*	S4LN-1208	S4LN-1209	20.76	32.24	30.08
-A1B, -A2B*	S4LN-1227	S4LN-1209	20.76	32.24	30.08
-B1B	S4LN-1227	S4LN-1209	20.76	32.24	30.08
-C1B	S4LN-1227	S4LN-1209	25.57	32.24	30.08
LIO-320					
-B1A	S4RN-21	S4RN-20	19.22	32.24	33.59
-C1A	S4RN-21	S4RN-21	19.22	32.24	33.59
* - Fixed Pitch Propeller					

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